

## PATENT ABSTRACTS OF JAPAN

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H05K 3/46

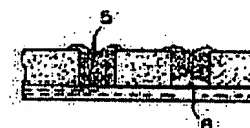
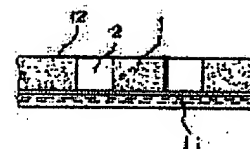
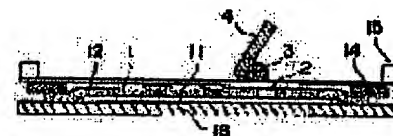
(21)Application number : 05-076215 (71)Applicant : ASAHI GLASS CO LTD  
(22)Date of filing : 10.03.1993 (72)Inventor : FUMIKURA TADAHARU  
ICHIMATSU TSUNEO

### (54) FILLING METHOD FOR VIAHOLE

#### (57)Abstract:

**PURPOSE:** To eliminate continuity defects due to the shortage of filling in a viahole and defects at the time of forming a wiring pattern due to the extrusion of a via land, which were conventional problems in the printing process of a ceramic multi-layer board.

**CONSTITUTION:** When a conductive paste 3 is filled into the viahole 2 of a green sheet used for a ceramic board, the conductive paste 3 is filled into the viahole 2 from a surface 12 in opposite to a surface 12 which forms a wiring pattern.



### LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the  
examiner's decision of rejection or application  
converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of  
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## CLAIMS

**[Claim(s)]**

[Claim 1] The restoration approach of the beer hall characterized by filling up a beer hall with conductive paste from the field which is the restoration approach of the conductive paste to the beer hall of a ceramic substrate or a green sheet, and forms a circuit pattern, and a reverse field.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

**[Industrial Application]** This invention relates to the restoration approach of beer halls, such as a green sheet of a ceramic multilayer substrate.

**[0002]**

**[Description of the Prior Art]** In manufacture of a ceramic multilayer substrate, in order to prevent the omission of Ag/Pd conductive paste on the occasion of the beer hall established in the green sheet by punching to fill up conductive paste, such as Ag/Pd, with screen-stencil etc., after sticking a filter paper on the bottom of a beer hall, usually a beer hall is filled up with Ag/Pd conductive paste by moving a squeegee to a green sheet and parallel, applying the pressure beforehand set up on the direct printing version.

**[0003]**

**[Problem(s) to be Solved by the Invention]** However, by this approach, there is a part where Ag/Pd conductive paste is filled up and does not go out in some beer halls, for this reason the problem that the flow between up-and-down layers could not be taken arose. Although it is possible to correct while the blinding of the poor alignment of a beer hall and a version prints, a defect like the lack of restoration is difficult for detecting during an activity, and is generated about 12% in the state of a stationary activity.

**[0004]** Moreover, Ag/Pd conductive paste is put back through a filter paper, and the beer land on the front face of a green sheet projects, and at the time of circuit pattern printing, sagging (NIJIMI) of the land for connection arises and it becomes the cause of a short circuit.

**[0005]** Drawing 3 showed this situation, (a) shows the lack of restoration at the time of beer hall printing, and (b) shows the short circuit at the time of circuit pattern printing. the beer with which it filled up with 5 by a diagram, and 6 -- a restoration lack part and 10 -- a conductor -- a land and 16 are tables.

**[0006]** Although giving roller credit and making a height common was also considered in order to prevent this problem, increase and breakage on a green sheet also had activity manday, and there were problems, such as yield lowering.

**[0007]** This invention solves the problem which the restoration approach of a conventional beer hall called the projection of the beer land of the defective continuity by the lack of restoration when being filled up with Ag/Pd conductive paste and a front face has in the beer hall established in the green sheet of a ceramic multilayer substrate, and it aims at obtaining the improvement in effectiveness of printing and pattern inspection, and formation of a reliable beer hall simultaneously.

**[0008]**

**[Means for Solving the Problem]** This invention is made that the above-mentioned technical problem should be solved, it is the restoration approach of the conductive paste to the beer hall of a ceramic substrate or a green sheet, and the restoration approach of the beer hall characterized by filling up a beer hall with conductive paste from the field which forms a circuit pattern, and a reverse field is offered.

**[0009]**

**[Example]** Drawing 1 is the notional sectional view in which showing the example of this invention and showing the situation of beer hall printing. (a) is [ (c of a restoration process and (b)) ] after beer hall restoration before beer hall restoration. The beer hall 2 established in the green sheet 1 by punching is filled up with Ag/Pd conductive paste 3.

Under the present circumstances, in order to prevent the omission of Ag/Pd conductive paste 3, a filter paper 11 is stuck on the bottom of a beer hall 2. A green sheet 1 is attached in a table 16 so that the opposite hand 12 of the side which wires may become a top face.

[0010] Since the version used for printing by this invention will be printed from a reverse field, it serves as the conventional printing to what hung the mirror compared with the usual thing. All the beer halls 2 can be filled up with Ag/Pd conductive paste by moving a squeegee 4 to a green sheet 1 and parallel, or pouring in by the pressure of Ayr, applying the pressure beforehand set up on the version 15 which hung this mirror.

[0011] Next, a circuit pattern is formed. Drawing 2 showed this situation. (a) is [ (c of presswork and (b)) ] after circuit pattern printing before circuit pattern printing. A green sheet is reversed so that the field 13 by the side of wiring of a green sheet 1 may come upwards, and a circuit pattern 9 is formed in this beer land 7 with new Ag/Pd conductive paste 8. the part of the restoration lack part 6 of the beer land 2 -- simultaneous -- a conductor -- since it is surely covered with a land 10, the filling factor of the beer hall section also improves and the flow between the vertical layers by the laminating of a class green sheet becomes good.

[0012] Moreover, since it is the field where the filter paper 11 touched, there is also no projection, an even field is maintained, the beer land front face by the side of 13 does not have defects, such as a short circuit which tends to take place by circuit pattern printing,, either, and excelling extremely as the restoration approach of the reliable beer hall 2 was checked. furthermore, the class green sheet printed by this approach -- a laminating and the front face of the calcinated substrate -- an Ag/Pd outer conductor and Au -- as a result of checking a flow after forming a conductor, it was checked that the defect is falling 8% conventionally.

[0013]

[Effect of the Invention] By operation of this invention, it was able to become possible to cancel the defective continuity by the lack of restoration of the beer hall section which was a problem conventionally, and the defect at the time of the circuit pattern formation by the projection of a beer land in the presswork of a ceramic multilayer substrate, and was able to lead also to compaction of circuit pattern inspection with the improvement in the yield, and working efficiency was able to be raised.

[0014] furthermore, beer hall formation and the front face of a fine pitch -- a conductor -- it becomes possible to make a land small and an efficient pattern design is made.

[0015] Moreover, although the restoration approach of a beer hall became difficult as the aspect ratio (ratio of the thickness of the diameter of a beer hall and a green sheet) became large, if this restoration approach is used, it is possible to 2.5 at an ASUBEKUTO ratio, and it turned out that restoration of a beer hall becomes easy from the former.

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**TECHNICAL FIELD**

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[Industrial Application] This invention relates to the restoration approach of beer halls, such as a green sheet of a ceramic multilayer substrate.

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**PRIOR ART**

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**EFFECT OF THE INVENTION**

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**TECHNICAL PROBLEM**

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**MEANS**

[Means for Solving the Problem] This invention is made that the above-mentioned technical problem should be solved, it is the restoration approach of the conductive paste to the beer hall of a ceramic substrate or a green sheet, and the restoration approach of the beer hall characterized by filling up a beer hall with conductive paste from the field which forms a circuit pattern, and a reverse field is offered.

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**EXAMPLE**

[Example] Drawing 1 is the notional sectional view in which showing the example of this invention and showing the situation of beer hall printing. (a) is [ (c of a restoration process and (b)) ] after beer hall restoration before beer hall restoration. The beer hall 2 established in the green sheet 1 by punching is filled up with Ag/Pd conductive paste 3. Under the present circumstances, in order to prevent the omission of Ag/Pd conductive paste 3, a filter paper 11 is stuck on the bottom of a beer hall 2. A green sheet 1 is attached in a table 16 so that the opposite hand 12 of the side which wires may become a top face.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The sectional view showing the beer hall restoration approach process of one example of this invention

[Drawing 2] The sectional view showing the circuit pattern presswork of one example of this invention

[Drawing 3] The sectional view of the beer hall restoration approach of the conventional example

[Description of Notations]

- 1: Green sheet
- 2: Beer hall
- 3: Conductive paste
- 4: Squeegee
- 5: Beer with which it filled up
- 6: Restoration lack part

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[Translation done.]

\* NOTICES \*

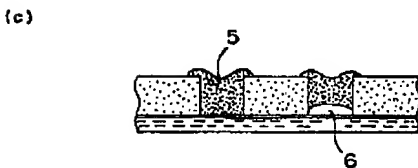
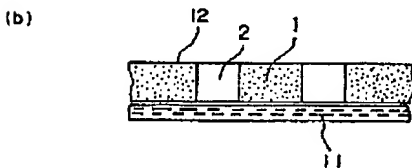
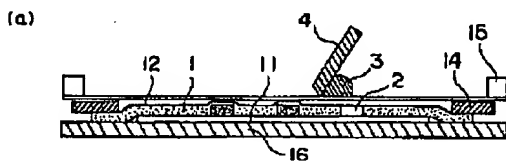
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DRAWINGS

[Drawing 1]

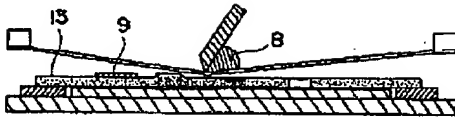
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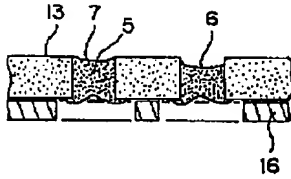
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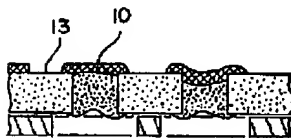
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(b)



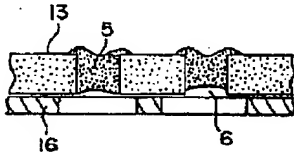
(c)



[Drawing 3]

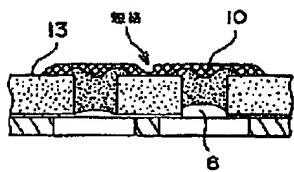
ビアホール印刷

(a)



(b)

配線パターン印刷



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(43)公開日 平成6年(1994)9月22日

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H 0 5 K 3/40	K	7511-4E		
3/46	N	6921-4E		
	H	6921-4E		

審査請求 未請求 請求項の数 1 F D (全 4 頁)

(21)出願番号	特願平5-76215	(71)出願人	000000044 旭硝子株式会社 東京都千代田区丸の内2丁目1番2号
(22)出願日	平成5年(1993)3月10日	(72)発明者	文蔵 忠治 神奈川県横浜市神奈川区羽沢町松原1160番地 エイ・ジー・テクノロジー株式会社内
		(72)発明者	一松 恒生 神奈川県横浜市神奈川区羽沢町松原1160番地 エイ・ジー・テクノロジー株式会社内
		(74)代理人	弁理士 泉名 謙治

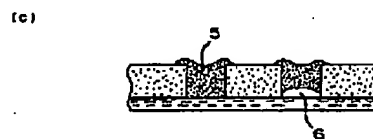
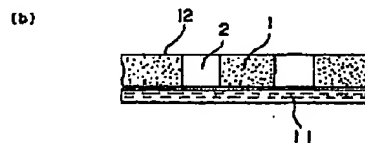
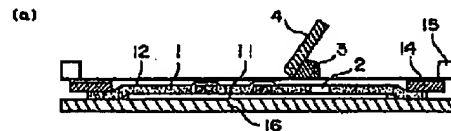
(54)【発明の名称】 ピアホールの充填方法

(57)【要約】

【目的】セラミック多層基板の印刷工程において従来問題であったピアホール部の充填不足による導通不良とビアランドの突起による配線パターン形成時の欠陥を解消することを可能とする。

【構成】セラミック基板用グリーンシート1のピアホール2へ導体ペースト3を充填する際、配線パターンを形成する面とは反対の面12からピアホール2に導体ペースト3を充填することを特徴とする。

ピアホール印刷



(2)

特開平6-268369

1

## 【特許請求の範囲】

【請求項1】セラミック基板もしくはグリーンシートのビアホールへの導体ペーストの充填方法であって、配線パターンを形成する面と反対の面からビアホールに導体ペーストを充填することを特徴とするビアホールの充填方法。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明はセラミック多層基板のグリーンシート等のビアホールの充填方法に関するものである。

## 【0002】

【従来の技術】セラミック多層基板の製造において、パンチングによりグリーンシートに設けたビアホールにスクリーン印刷等でAg/Pd等の導体ペーストを充填するに際し、Ag/Pd導体ペーストの抜けを防止するためビアホールの下にろ紙を貼り付けた後、直接印刷版上に予め設定された圧力を加えながらスキージをグリーンシートと平行に動かすことにより、Ag/Pd導体ペーストをビアホールに充填するのが通常である。

20

## 【0003】

【発明が解決しようとする課題】しかし、この方法では、一部のビアホールにAg/Pd導体ペーストが充填し切れない箇所があり、このために上下の層間での導通が取れないという問題が生じた。ビアホールの位置合わせ不良や版の目詰まりは印刷しながら修正することは可能であるが、充填不足のような欠陥は作業中に検出することは困難であり、定常作業の状態で約12%発生する。

【0004】また、ろ紙でAg/Pd導体ペーストが押し戻されグリーンシート表面のビアランドが突起し、配線パターン印刷時に接続用ランドのダレ（ニジミ）が生じて短絡の原因となる。

## 【0005】この様子を示したのが、図3であり、

(a)はビアホール印刷時の充填不足を示したものである。(b)は配線パターン印刷時の短絡を示したものである。図で、5は充填されたビア、6は充填不足部分、10は導体ランド、16はテーブルである。

【0006】この問題を防ぐためにローラ掛けを施して突起部を平らにすることも考えられるが、作業工数が増え、グリーンシートの損傷もあり歩留り低下等の問題があった。

【0007】本発明はセラミック多層基板のグリーンシートに設けたビアホールに、Ag/Pd導体ペーストを充填したときの充填不足による導通不良と表面のビアランドの突起という、従来のビアホールの充填方法の持つ問題を解決するものであり、同時に印刷作業およびパターン検査の効率向上と信頼性の高いビアホールの形成を得ることを目的としている。

## 【0008】

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【課題を解決するための手段】本発明は前述の課題を解決すべくなされたものであり、セラミック基板もしくはグリーンシートのビアホールへの導体ペーストの充填方法であって、配線パターンを形成する面と反対の面からビアホールに導体ペーストを充填することを特徴とするビアホールの充填方法を提供するものである。

## 【0009】

【実施例】図1は本発明の実施例を示すものであって、ビアホール印刷の様子を示す概念的断面図である。

(a)は充填工程、(b)はビアホール充填前、(c)はビアホール充填後である。パンチングによりグリーンシート1に設けたビアホール2にAg/Pd導体ペースト3を充填する。この際、Ag/Pd導体ペースト3の抜けを防止するために、ビアホール2の下にろ紙11を貼り付ける。グリーンシート1は、配線を行う側の反対側12が上面になるようテーブル16に取り付けられる。

【0010】本発明での印刷に用いる版は、従来の印刷とは反対の面から印刷することになるため、通常のものに比べてミラーを掛けたものになる。このミラーを掛けた版15上に予め設定された圧力を加えながらスキージ4をグリーンシート1と平行に動かすか、もしくはエアーの圧力で注入することにより、すべてのビアホール2にAg/Pd導体ペーストを充填することができる。

【0011】次に、配線パターンを形成する。この様子を示したのが図2である。(a)は印刷工程、(b)は配線パターン印刷前、(c)は配線パターン印刷後である。グリーンシート1の配線側の面13が上にくるようにグリーンシートを反転し、このビアランド7に新たなAg/Pd導体ペースト8で配線パターン9を形成する。ビアランド2の充填不足部分6の箇所も同時に導体ランド10によって必ず覆われるため、ビアホール部の充填率が向上し、各層グリーンシートの積層による上下層間の導通が良くなる。

【0012】また、13側のビアランド表面はろ紙11が接触していた面であるため、突起もなく、平らな面が維持され、配線パターン印刷で起こりがちな短絡等の欠陥もなく、信頼性の高いビアホール2の充填方法として極めて優れていることが確認された。更にこの方法で印刷した各層グリーンシートを積層、焼成した基板の表面にAg/Pd外部導体、Au導体を形成した後導通を確認した結果、従来よりも不良が8%低下していることが確認された。

## 【0013】

【発明の効果】本発明の実施により、セラミック多層基板の印刷工程において従来問題であったビアホール部の充填不足による導通不良とビアランドの突起による配線パターン形成時の欠陥を、解消することが可能となり、歩留り向上と共に配線パターン検査の短縮にもつながり、作業効率を向上させることができた。

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特開平6-268369

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【0014】さらに、ファインピッチのビアホール形成や表面導体ランドを小さくすることが可能となり、効率のよいパターン設計ができる。

【0015】また、アスペクト比（ビアホール径とグリーンシートの厚みの比）が大きくなるにつれて、ビアホールの充填方法が困難になってくるが、この充填方法を用いるとアスペクト比で2.5まで可能であり、従来よりもビアホールの充填が容易となることがわかった。

【図面の簡単な説明】

【図1】本発明の一実施例のビアホール充填方法工程を10示す断面図

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\*【図2】本発明の一実施例の配線パターン印刷工程を示す断面図

【図3】従来例のビアホール充填方法の断面図

【符号の説明】

1：グリーンシート

2：ビアホール

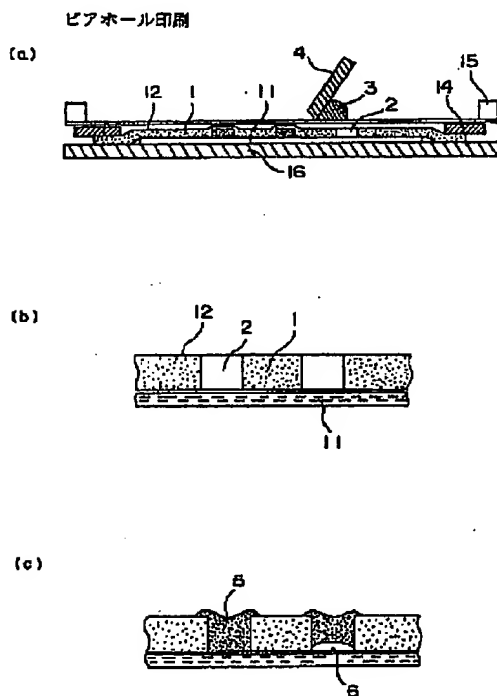
3：導体ペースト

4：スキージ

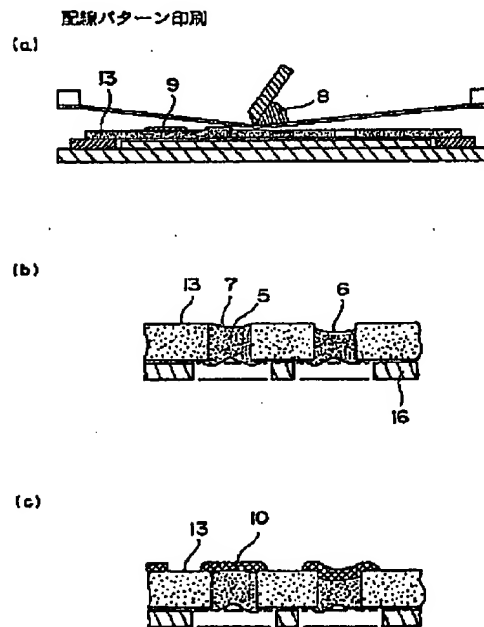
5：充填されたビア

6：充填不足部分

【図1】



【図2】



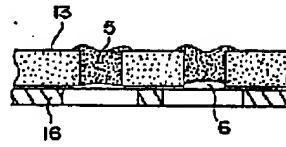
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特開平6-268369

【図3】

ビアホール印刷

(a)



配線パターン印刷

(b)

